

a ferrule to guide the optical fiber so as to contact the optical fiber with the first surface of the prism, the first surface being substantially perpendicular to the optical fiber; and

an aspheric lens integrated on the second surface, the integrated aspheric lens being positioned so that the prism serves to redirect a light beam at an angle relative to an axis of the an optical source input through total internal reflection by utilizing the base of the triangle wedge element, the aspheric lens serving to at least one of collimate the redirected light beam and focus the light beam before being redirected.

2. (Rewritten in independent form) ~~The connector of claim 1,~~ A connector to an optical fiber, comprising:

a prism that includes a triangular wedge element having a first surface, a second surface and a base;

a ferrule to guide the optical fiber so as to contact the optical fiber with the first surface of the prism, the first surface being substantially perpendicular to the optical fiber; and

an aspheric lens integrated on the second surface, the integrated aspheric lens being positioned so that the prism serves to redirect a light beam at an angle relative to an axis of an optical source input through total internal reflection by utilizing the base of the triangle wedge element, the aspheric lens serving to at least one of collimate the redirected light beam and focus the light beam before being redirected, wherein the connector is a fiber collimator.

3. (Rewritten in independent form) ~~The connector of claim 1,~~ A connector to an optical fiber, comprising:

a prism that includes a triangular wedge element having a first surface, a second

surface and a base;

a ferrule to guide the optical fiber so as to contact the optical fiber with the first surface of the prism, the first surface being substantially perpendicular to the optical fiber; and

an aspheric lens integrated on the second surface, the integrated aspheric lens being positioned so that the prism serves to redirect a light beam at an angle relative to an axis of an optical source input through total internal reflection by utilizing the base of the triangle wedge element, the aspheric lens serving to at least one of collimate the redirected light beam and focus the light beam before being redirected, wherein the connector is a fiber coupler.

4. (Original) A fiber collimator, comprising:

a prism that includes a triangular wedge element having a first surface, a second surface and a base;

a ferrule to guide an optical source input to the fiber collimator so as to contact the optical source input with the first surface of the prism, the first surface being substantially perpendicular to the optical source input; and

an aspheric lens integrated on the second surface, the integrated aspheric lens being positioned so that the prism serves to redirect a light beam at an angle relative to an axis of the optical source input, and the aspheric lens serves to collimate the redirected light beam, the base of the triangle wedge element redirecting the light beam by total internal reflection (TIR).

5. (Original) The fiber collimator of claim 4, wherein the triangular wedge element is an isosceles triangle wedge, the length of the first surface being equal to the length of the second surface.

6. (Original) The fiber collimator of claim 4, wherein the prism further comprises a spacer element, the spacer element providing a mechanism to adjust an optical path length from the aspheric lens to the optical source input, allowing the focal length of the aspheric lens, and thereby the radius of the collimated light beam, to be adjusted while keeping the dimensions of the triangle wedge element constant.

7. (Original) The fiber collimator of claim 4, wherein diamond-turned inserts are utilized to define optical quality surfaces, including those for at least one of the prism, the aspheric lens and the TIR surface.

8. (Original) A fiber coupler, comprising:  
a prism that includes a triangular wedge element having a first surface, a second surface and a base;  
an aspheric lens integrated on the second surface, the integrated aspheric lens receiving a light beam, the aspheric lens being positioned so that the light beam is focused after passing through the aspheric lens, creating a focal spot image; and  
a ferrule to guide an optical fiber of the fiber coupler so as to contact an optical fiber core of the optical fiber with the first surface of the prism at or near the location of the focal spot image, wherein the base of the triangle wedge element serves to redirect the focused light beam by total internal reflection (TIR) at an angle relative to an axis of the optical fiber, the focused light beam being directed into the optical fiber core.

9. (Original) The fiber coupler of claim 8, wherein the triangular wedge element is an isosceles triangle wedge, the length of the first surface being equal to the length of the second surface.

10. (Original) The fiber coupler of claim 8, wherein the prism further

comprises a spacer element, the spacer element providing a mechanism to adjust an optical path length from the aspheric lens to the optical fiber, allowing the focal length of the aspheric lens, and thereby the numerical aperture of the light delivered to the optical fiber, to be adjusted while keeping the dimensions of the triangle wedge element constant.

11. (Original) The fiber coupler of claim 8, wherein the light beam received by the aspheric lens is an elliptically shaped, collimated light beam and the focal spot imaged onto the fiber core is circular or substantially circular, the base of the triangle wedge element having curvature to enable this TIR surface to act as a cylindrical mirror, the aspheric lens being toric with its principle axes aligned with those of the cylindrically curved TIR surface, the combination of the cylindrically curved TIR surface and the toric aspheric lens serving to collimate and correct for spherical aberrations and rendering the focal spot imaged onto the fiber core circular or substantially circular.

12 (Original) The fiber coupler of claim 8 wherein the lens parameters for the aspheric lens is optimized by utilizing a source with a numerical aperture that completely fills the full aperture of the lens.

13 (Original) A collimating element, comprising:  
a prism that includes a triangular wedge element having a first surface, a second surface and a base, the base of the triangle wedge element having curvature to enable it to act as a cylindrical mirror to redirect the light beam by total internal reflection; and  
an aspheric lens integrated on the second surface, the aspheric lens being toric with principle axes aligned with those of the cylindrically curved base of the triangle wedge element, the integrated aspheric lens being positioned so that a chief ray of the light

beam passes directly through the axis of the aspheric lens, wherein the light beam from an optical source input is an elliptically shaped beam, the elliptically shaped beam being redirected at an angle relative to an axis of the optical source input by the cylindrically curved base, the redirected light beam being collimated by the aspheric lens, the collimated light beam being a circularly or substantially circularly shaped beam, wherein the aspheric lens serves to collimate the redirected light beam, the base of the triangle wedge element redirecting the light beam by total internal reflection.

14. (Original) The collimating element of claim 13, wherein the optical source input is an edge-emitting laser.

15. (Original) A collimating optical subassembly for collimating and redirecting a divergent light beam from a point source, comprising:

an aspheric lens that receives and collimates the divergent light beam, creating a collimated light beam;

a spacer element above the aspheric lens; and

a wedge element that refracts the collimated light beam into air at an angle relative to the axis of the aspheric lens consistent with Snell's law, the wedge element being positioned above the spacer element, wherein the collimating optical subassembly is fabricated of optically transparent material and integrated as a single part using injection-molding techniques.

16. (Original) The collimating optical subassembly of claim 15, wherein the point source is a vertical cavity surface emitting laser diode.

17. (Original) The collimating optical subassembly of claim 15, wherein the spacer element is inserted to allow molten optically transparent material to more easily

flow through a mold for fabricating the collimating optical subassembly using standard injection molding techniques.

18. (Original) The collimating optical subassembly of claim 15, wherein the prism is made of an optically transparent material, the optically transparent material including any one of polycarbonate, polyolefin and polyethylimide.

19. (Original) The collimating optical subassembly of claim 15, wherein the aperture of the aspheric lens is made larger than the waist of collimated light beam outputted from the wedge element.

20. (Original) A focusing optical subassembly for redirecting and focusing a collimated light beam, comprising:

a wedge element that receives the collimated light beam traveling in air;

a spacer element below the wedge element; and

an aspheric lens below the spacer element, wherein the focusing optical subassembly is fabricated of optically transparent material and integrated as a single part using injection-molding techniques, and wherein the collimated light beam received by the wedge element travels in air at an angle relative to an axis of the aspheric lens, the wedge element redirecting a chief ray of the collimated beam through the spacer element along the axis of the aspheric lens, the aspheric lens focusing the collimated light beam to a point along its axis.

21. (Rewritten in independent form) ~~The focusing optical subassembly of claim 20,~~ A focusing optical subassembly for redirecting and focusing a collimated light beam, comprising:

a wedge element that receives the collimated light beam traveling in air;

a spacer element below the wedge element; and  
an aspheric lens below the spacer element, wherein the focusing optical subassembly is fabricated of optically transparent material and integrated as a single part using injection-molding techniques, wherein the collimated light beam received by the wedge element travels in air at an angle relative to an axis of the aspheric lens, the wedge element redirecting a chief ray of the collimated beam through the spacer element along the axis of the aspheric lens, the aspheric lens focusing the collimated light beam to a point along its axis, and wherein a photodetector resides at the point to which the collimated light beam is focused by the aspheric lens.

22. (Rewritten in independent form) The focusing optical subassembly of claim 20, A focusing optical subassembly for redirecting and focusing a collimated light beam, comprising:

a wedge element that receives the collimated light beam traveling in air;  
a spacer element below the wedge element; and  
an aspheric lens below the spacer element, wherein the focusing optical subassembly is fabricated of optically transparent material and integrated as a single part using injection-molding techniques, and wherein the collimated light beam received by the wedge element travels in air at an angle relative to an axis of the aspheric lens, the wedge element redirecting a chief ray of the collimated beam through the spacer element along the axis of the aspheric lens, the aspheric lens focusing the collimated light beam to a point along its axis, and wherein the spacer element is inserted to allow molten optically transparent material to more easily flow through a mold for fabricating the focusing optical subassembly using standard injection molding techniques.